ANNUAL REPORT FOR 2007

Little River Bridge Mitigation Site
Moore County
TIP No. R-0210A

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

SUMMARY

The following report summarizes the monitoring activities that have occurred in 2007 at the Little River Bridge Mitigation Site. The 2007 monitoring year represents the second year of hydrologic and vegetation monitoring following construction. The site must demonstrate hydrologic and vegetation success for a minimum of five years or until the site is deemed successful. The site was constructed to serve as mitigation for impacts associated with the US 1 Bypass in Moore County.

In February 2006, groundwater monitoring gauges were installed to monitor hydrology on the site. Four groundwater gauges and one rain gauge were positioned on the restoration site. There are also three reference gauges that were installed prior to construction. The reference gauges are located directly adjacent to the constructed site within the preservation area.

Hydrologic success criteria are based on the approved mitigation plan and require that the site demonstrate saturation or inundation within 12 inches of the soil surface for a consecutive 12.5% of the growing season during years of normal rainfall. According to the Drought Management Advisory Council for North Carolina, Moore County experienced exceptional drought conditions for 2007.

2007 represents the second year for hydrology monitoring. Two of the four groundwater restoration gauges met the success criteria for 2007. The three reference gauges recorded jurisdictional hydrology above the required 12.5% of the growing season.

Vegetation monitoring in the restoration area yielded 375 trees/shrubs per acre. This average is above the minimum success criteria of 320 trees/shrubs per acre. The Little River Site has met the success criteria for 2007 monitoring year, but to increase the proportion of shrubs, this area will be supplementally planted in 2008.

Based on the results from the second year of monitoring, NCDOT will continue to monitor vegetation and hydrology at the Little River Bridge Mitigation Site.

1.0 INTRODUCTION

1.1 Project Description

The Little River Bridge Mitigation Site serves as mitigation for T.I.P R-0210A, which is the US 1 Bypass in Moore County (Figure 1). The 14.8-acre site is located in Moore County 0.75 mile southeast of the town of Vass and is on either side of the Little River. The site can be accessed via US 1 Business South on the northeastern site boundary. The 14.8-acre site includes 6.4 acres of restoration and 8.4 acres of preservation of bottomland hardwood forest. Reference areas onsite were utilized to provide reference data for restoration monitoring.

1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetation monitoring must be conducted for a minimum of five years or until the site is deemed successful. Vegetation success criteria states that at least 320 trees/acre must survive through Year three. A ten percent mortality rate will be accepted in Year four (288 trees/acre) and another ten percent in Year five, resulting in a required survival rate of 260 trees/acre. Hydrologic success criteria are based on the approved mitigation plan and require that the site demonstrate saturation or inundation within 12 inches of the soil surface for a consecutive 12.5% of the growing season during years of normal rainfall. This report includes analyses of hydrologic and vegetation monitoring results, discussions of local climatic conditions throughout the growing season, and site photographs.

1.3 Project History

2005	Reference Gauges Installed
January 2006	Site Constructed
February 2006	Site Planted
February 2006	Monitoring Gauges Installed
March-November 2006	Hydrologic Monitoring (Year 1)
June 2006	Vegetation Monitoring (Year 1)
March-November 2007	Hydrologic Monitoring (Year 2)
June 2007	Vegetation Monitoring (Year 2)

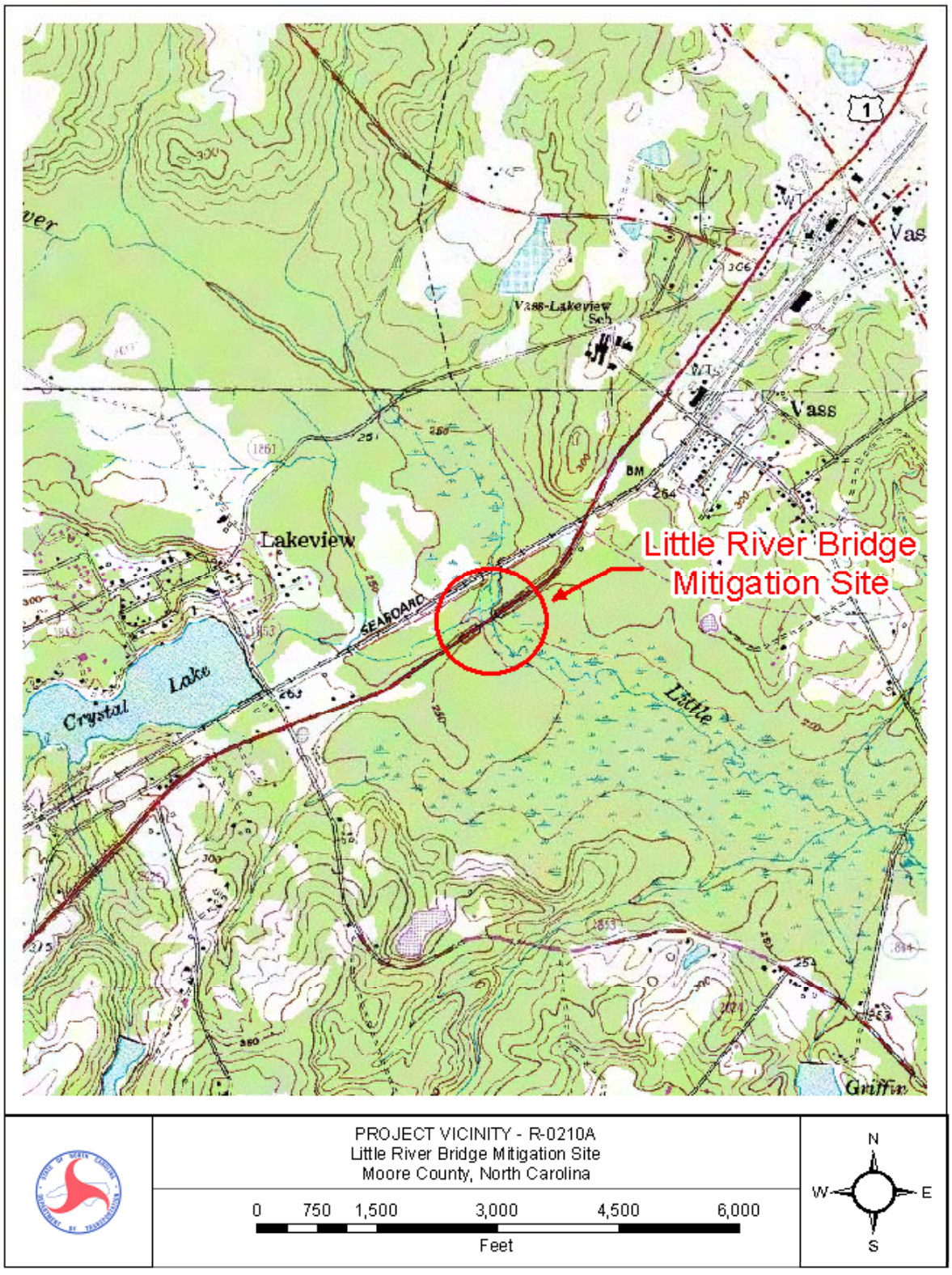


Figure 1. Site Location Map

2.0 HYDROLOGY

2.1 Success Criteria

The hydrologic success criteria established for the Little River Bridge Mitigation Site, as stipulated in the approved mitigation plan and subsequent revisions, require that the site demonstrate saturation or inundation within 12 inches of the soil surface for a consecutive 12.5% of the growing season during years of normal rainfall.

The growing season in Moore County begins on March 23 and ends November 7. These dates correspond to a 50% probability that air temperature will drop to 28° after March 23 and before November 7[1]; thus, the growing season is 228 days.

2.2 Hydrologic Description

Four groundwater monitoring gauges were installed within the site's restoration area (Figure 2) in February 2006. There are also three reference gauges that were installed prior to construction in the existing wetlands that are adjacent to the constructed site. A rain gauge is also located on the site to assist in comparison of the rainfall data (supplied by the NC State Climate Office) from an official weather station in Carthage. The groundwater gauges record water levels on a daily basis.

2.3 Results of Hydrologic Monitoring

2.3.1 Site Data

The maximum number of consecutive days that saturation occurred within 12 inches of the ground surface was determined for each groundwater monitoring gauge. This number was converted into a percentage of the 228-day growing season (March 23 – November 7). Table 1 provides the 2007 hydrologic results; Figure 3 is a graphical representation of these results. Appendix A includes graphs of the data recorded at each groundwater gauge. Daily rainfall events recorded at the onsite rain gauge are included on each of the groundwater gauge plots.

[1] Soil Conservation Service, Soil Survey of Moore County, North Carolina, 1995.

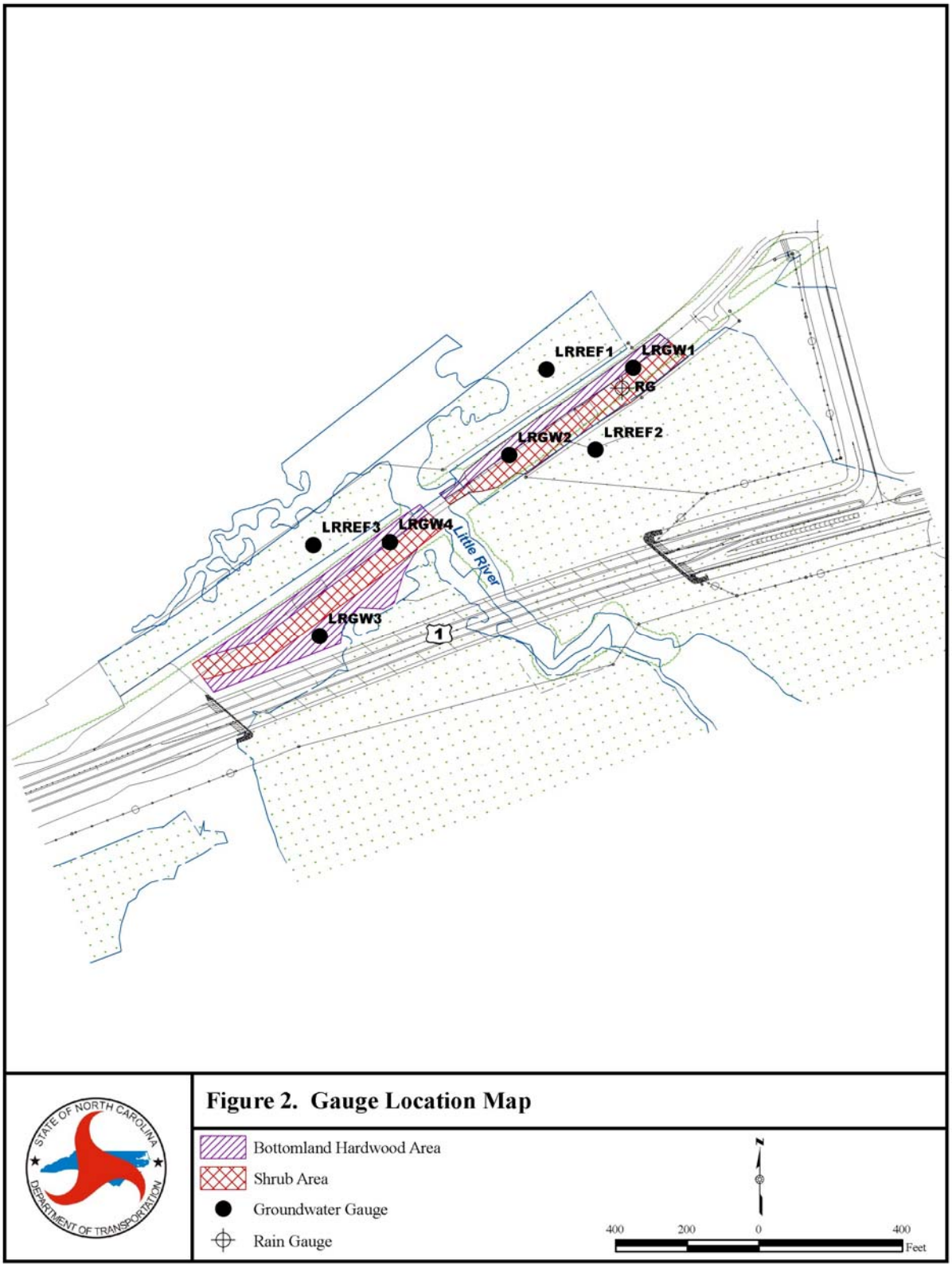


Figure 2. Monitoring Gauge Location Map

Table 1. Hydrologic Monitoring Results

Monitoring Gauge	< 5%	5-8%	8-12%	> 12.5%	Actual %	Success Dates
LR-GW1+				**X**	18.7	March 23-May 4
LR-GW2		**X**			7.4	
LR-GW3+				**X**	19.6	March 23-May 6
LR-GW4		**X**			5.7	
LR-REF1+				**X**	17.8	March 23-May 2
LR-REF2 +				**X**	24.3	March 23-May 17
LR-REF3+				**X**	17.4	March 23-May 1

Shaded gauges are reference gauges.

+Gauge met success during an average rainfall month (April, June, and September).

Specific Gauge Problems:

- Gauge (LR-REF2) was damaged and replaced (August 16 – September 18)

Groundwater Monitoring Gauges 2 and 4 were not successful in 2007. The close proximity to the Little River may be causing a drawdown effect on the gauges. NCDOT will continue to monitor this gauge and may install additional gauges if necessary to determine whether or not wetland hydrology is present in this portion of the site.

2.3.2 Climatic Data

Figure 4 is a comparison of the 2007 monthly rainfall to the historical precipitation (collected between 1976 and 2007) for Carthage, North Carolina. This comparison gives an indication of how 2007 relates to historical data in terms of climate conditions. The NC State Climate Office provided all historical rainfall information.

For 2007 year, February, March, May, July, August, October, and November recorded below average rainfall for the site. The months of April, June, and September recorded average rainfall, while January recorded above average rainfall. Due to the drought, 2007 year experienced a below average rainfall year.

2.4 Conclusions

The 2007 monitoring year represents the second year of hydrologic monitoring for the Little River Bridge Mitigation Site. Two of the four groundwater restoration gauges met the success criteria for 2007. The three reference gauges recorded jurisdictional hydrology above the required 12.5% of the growing season.

NCDOT will continue to monitor the Little River Bridge Mitigation Site for hydrology

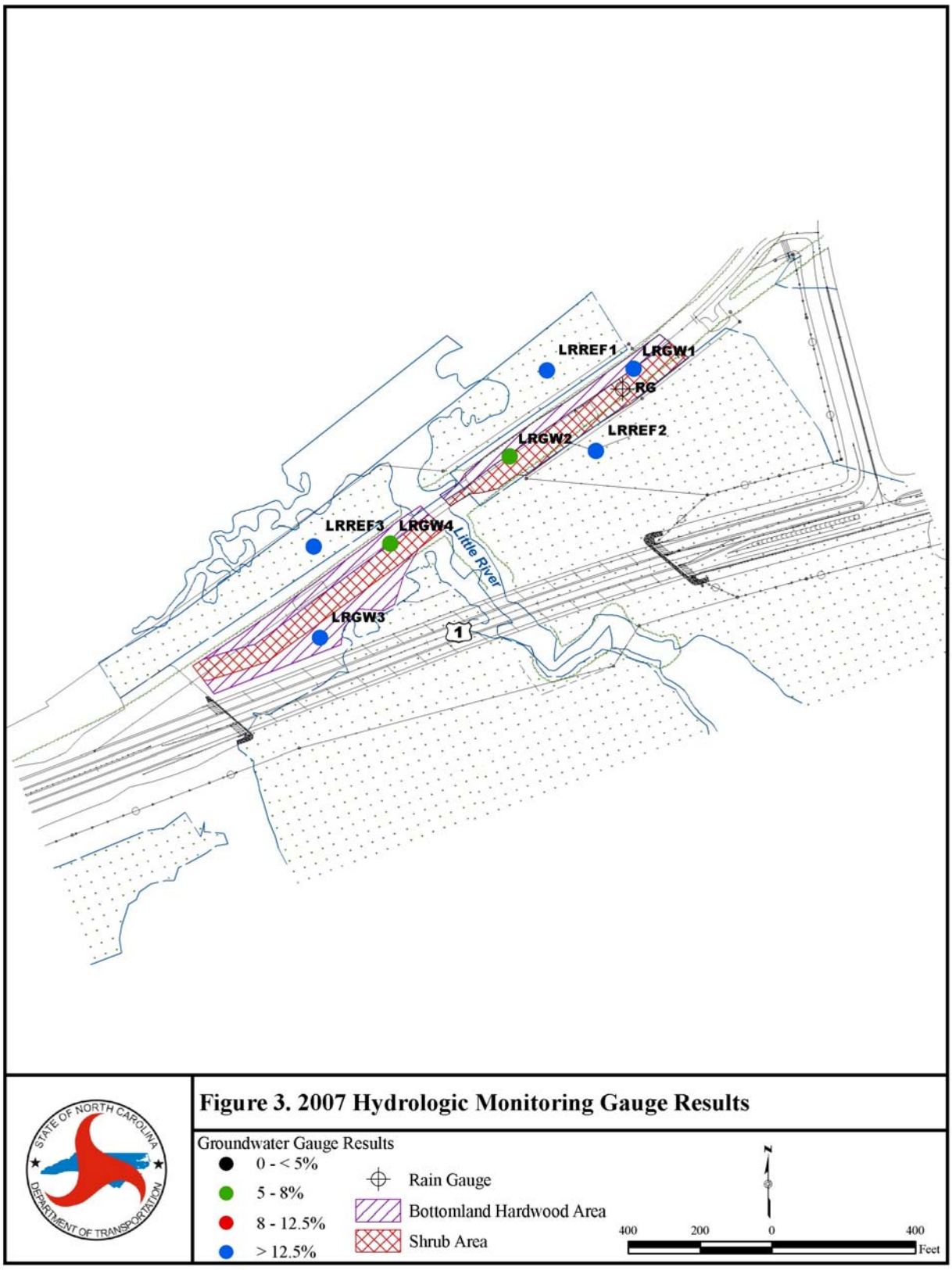
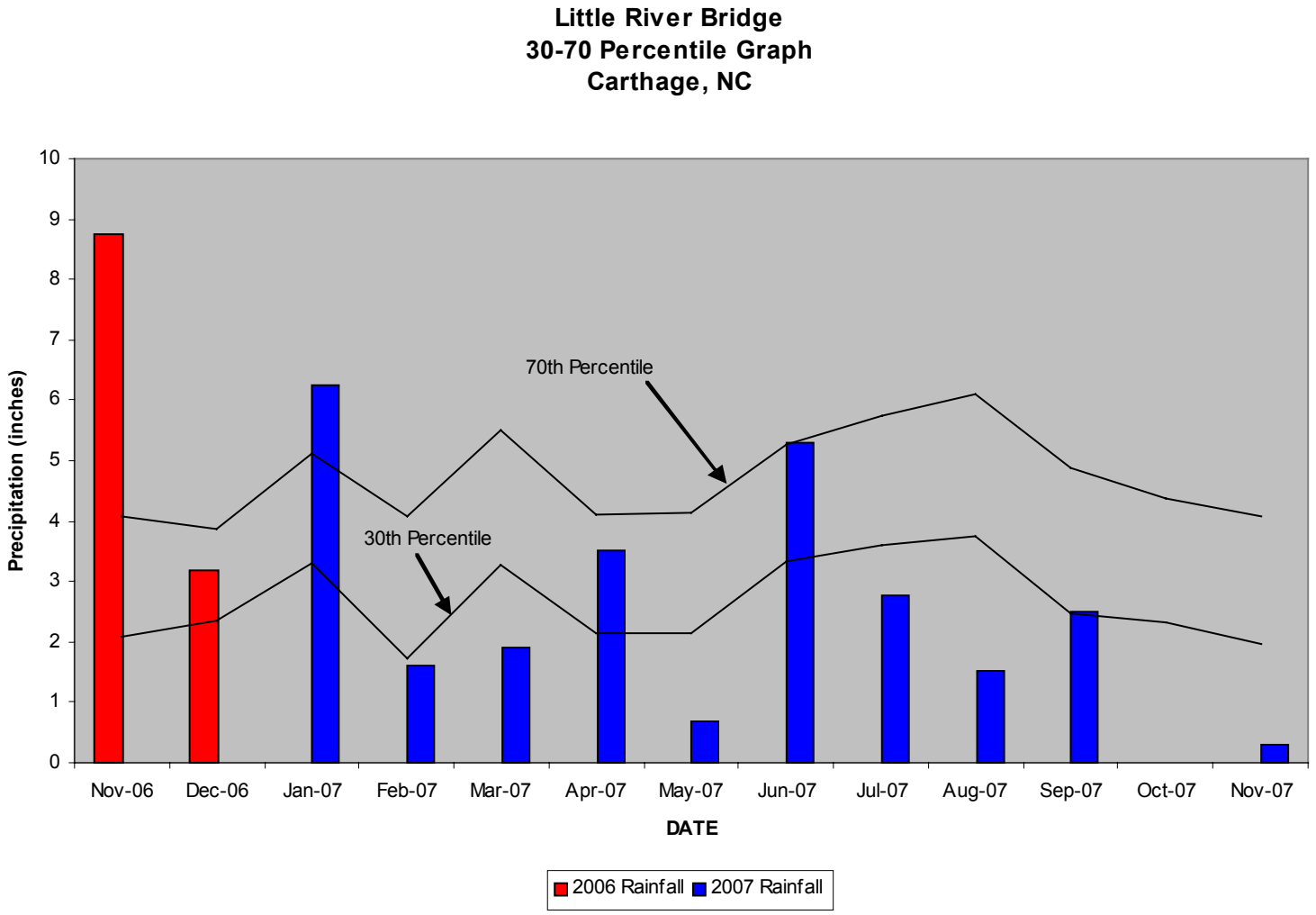


Figure 3. 2007 Hydrologic Monitoring Results Map

Figure 4. 30-70 Percentile Graph



3.0 VEGETATION: LITTLE RIVER BRIDGE MITIGATION SITE (YEAR 2 MONITORING)

3.1 Success Criteria

The projects success criteria state that at least 320 trees/acre must survive through Year three. A ten percent mortality rate will be accepted in Year four (288 trees/acre) and another ten percent in Year five, resulting in a required survival rate of 260 trees/acre.

3.2 Description of Species

The following tree and shrub species were planted in the Wetland Restoration Area:

Tree Area:

Taxodium distichum, Baldcypress

Nyssa aquatica, Water Tupelo

Quercus phellos, Willow Oak

Quercus michauxii, Swamp Chestnut Oak

Shrub Area:

Cephalanthus occidentalis, Buttonbush

Aronia arbutifolia, Red Chokeberry

Cornus amomum, Silky Dogwood

Alnus serrulata, Tag Alder

3.3 Results of Vegetation Monitoring

Table 2. Vegetation Monitoring Results (Hardwood Areas)

Plot #	Baldcypress	Water Tupelo	Willow Oak	Swamp Chestnut Oak	Buttonbush	Red Chokeberry	Silky Dogwood	Tag Alder	Total (Year 2)	Total (at planting)	Density (Trees/Acre)
1 (Trees)	2	7	9	30					48	60	544
2 (Shrubs)						1	12	3	16	53	205
Average Density (Trees & Shrubs/Acre)											375

Site Notes: Other species noted: *Juncus* sp., goldenrod, pokeberry, pine, smartweed, sweetgum, fennel, dogwood, kudzu, and various grasses.

3.4 Conclusions

There were 2 vegetation monitoring plots established throughout the 4.7-acre planting area. The 2007 vegetation monitoring of the site revealed an average tree density of 375 trees/shrubs per acre. This average is above the minimum success criteria of 320 trees/shrubs per acre. The Little River Site has met the success criteria for 2007 monitoring year, but to increase the proportion of shrubs, this area will be supplementally planted in 2008.

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

The 2007 monitoring year represents the second year of hydrologic monitoring for the Little River Bridge Mitigation Site. Two of the four groundwater restoration gauges met the success criteria for 2007. The three existing reference gauges recorded jurisdictional hydrology above the required 12.5% of the growing season.

Vegetation monitoring yielded 375 trees/shrubs per acre. This average is well above the minimum success criteria of 320 trees/shrubs per acre. The site will be supplementally planted in 2008 to increase shrub survivability.

NCDOT will continue to monitor the Little River Bridge Mitigation Site for vegetation and hydrology.

APPENDIX A

GAUGE DATA GRAPHS

APPENDIX B

PHOTO AND VEGETATION PLOT LOCATIONS, SITE PHOTOS

Little River Bridge

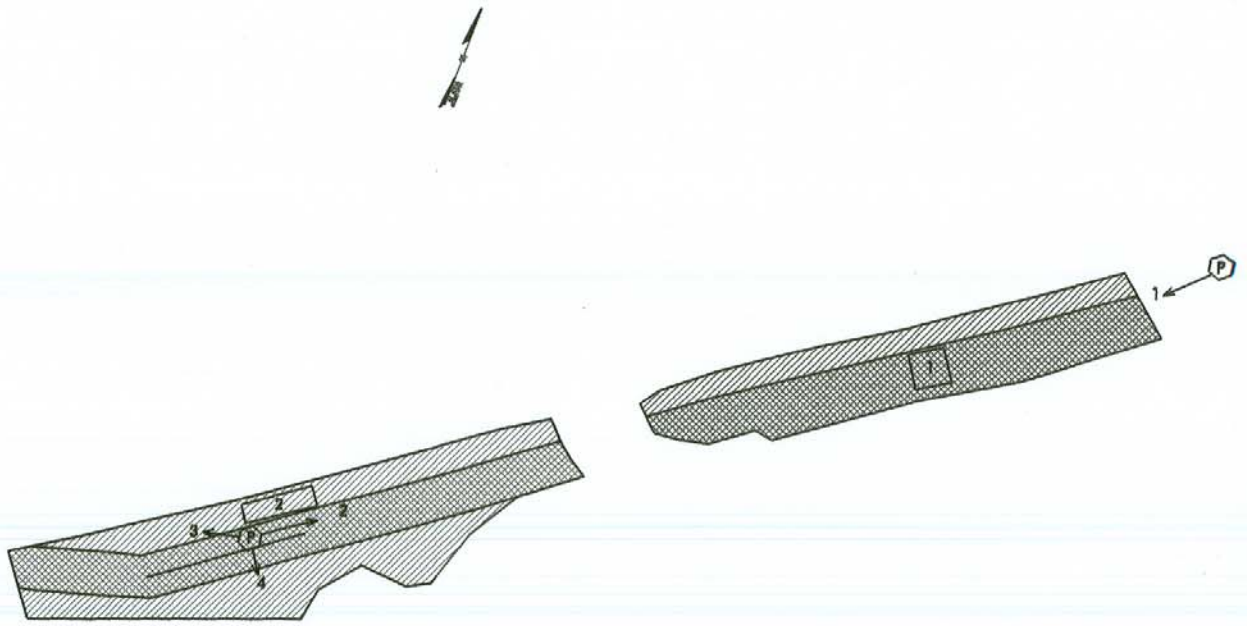
Photo 1

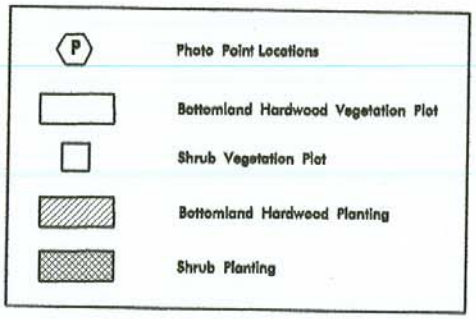
Photo 2

Photo 3

Photo 4

June 2007





Vass Bypass – Little River Bridge